

## REMARKS

Consideration of the above-identified application in view of the foregoing amendments and following remarks is respectfully requested.

### A. Status of the Claims and Explanation of Amendments

At the outset, Applicants express their sincere gratitude for the courtesies extended by the Examiner during the telephone interviews on December 15 and 20, 2010, during which the pending rejections were discussed as well as disclosure of one of the cited references, as mentioned below.

Claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25, and 27-30 were pending.

Claims 1, 5, 10, 28, and 29 are amended. For example, this paper amends independent claim 1 to expressly describe that the porous structure of the polymeric sheet has a microstructure of "nodes" as well as fibrils, and that the interior volume of the porous structure is "between the nodes and fibrils." Independent claims 5 and 10 are amended similarly.

Claims 28 and 29 are amended to be consistent with claim 1. These claims recite that the interior volume of the polymeric sheet comprises a porosity of the polymeric sheet of 40% to 95% and 70% to 95%, respectively.

No new matter will be added to this application by entry of these amendments. Entry of these amendments is respectfully requested.

Claims 1, 3, 8, 9, 12-14, 24, 25, and 27-29 were rejected pursuant to 35 U.S.C. § 102(b) as allegedly being anticipated by Eur. Pat. No. 0 503 147 A1 ("Ohashi"). [9/29/2010 Office Action at pp. 2-3]. Claims 5, 6, 10, 15, 17, and 30 were rejected pursuant to 35 U.S.C. § 103(a) as allegedly being unpatentable over Ohashi in view of U.S. Pat. No. 6,059,943 to Murphy et al. ("Murphy") and U.S. Pat. No. 5,147,722 to Koslow ("Koslow"). [9/29/2010 Office Action at pp. 3-4].

B. Applicants' Claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25, And  
27-30 Are Patentably Distinct From The Cited References

The rejections of claims 1, 3, 5, 6, 8-10, 12-15, 17, 24, 25, and 27-30 pursuant to Sections 102 or 103 are respectfully traversed. As explained more fully below, the cited references, taken alone or in combination fail to teach, disclose or suggest the subject matter of Applicants' independent claim 1. Accordingly, withdrawal of these rejections is requested.

Applicants' claim 1 recites:

"1. An integral, substantially air impermeable polymeric membrane for use in an electrochemical apparatus or process comprising:

a) a polymeric sheet comprising a polymer and having a porous structure with a microstructure of nodes and fibrils and an interior volume of a porous structure between the nodes and fibrils,

b) the polymeric sheet having distributed in the nodes and fibrils of the polymeric sheet:

- i) metal;
  - ii) an organic polymer; or
  - iii) a combination thereof, and
- c) said interior volume of said porous structure comprising a porosity of the polymeric sheet of greater than 35% and being substantially occluded by an ion-exchange resin to provide ionic conductance for use in the electrochemical apparatus or process."

1. *Ohashi Does Not Anticipate Applicants'*  
*Claims 1, 3, 8, 9, 12-14, 24, 25, and 27-29*

Ohashi, the main reference cited in both of the rejections, discloses a porous metallized fluorinated polymer. [Ohashi, p. 2, lines 30-33]. Ohashi's *intended result* is a structure having three components arranged as follows: (1) a fluorinated polymer substrate that is porous, (2) a hydrophilic fluorinated polymer coated on the inside surfaces of the pores, and (3) a metal film formed on the hydrophilic fluorinated polymer coating. [See, e.g., Ohashi, p. 2, lines 37-38 (a hydrophilic polymer coating is bonded to the inside surface of the pores of a porous fluoropolymer substrate) and p. 2, lines 40-41 (a metal film is formed on the surface inside of the pores on top of the hydrophilic polymer coating)]. That structure differs markedly from Applicants' claim 1.

a. *Ohashi's Metal Coating Is On The Pores, And  
Is Not Distributed Within The Porous Structure Itself*

First, Ohashi's polymer substrate does not have metal (or organic polymer)<sup>1</sup> distributed *within the polymer itself*. Applicants' claim 1 describes the polymeric sheet as having "a microstructure of nodes and fibrils" and "an interior volume of a porous structure between the nodes and fibrils."

Applicants' claim 1 recites that the metal, organic polymer or combination therefore is "distributed in the nodes and fibrils of the polymeric sheet." The material either is within the nodes or it is within the fibrils. A metal coating on a surface of the pores, such as disclosed by Ohashi [*See* Ohashi, p. 8, line 14 ("on at least the inside surface of the pores thereof")], is not sufficient to meet this claim language.

Accordingly, Ohashi fails to teach, disclose or suggest "a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils ...

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<sup>1</sup> The office action does not allege that Ohashi discloses an organic polymer distributed within the polymer substrate. It only alleged that Ohashi has a polymeric sheet with various metals distributed therein. [*See* 9/29/2010 Office Action at p. 2].

having distributed in the nodes and fibrils of the polymeric sheet: i) metal; ii) an organic polymer; or iii) a combination thereof" as recited in Applicants' claim 1.<sup>2</sup>

b. *Ohashi's Saponified Copolymer, Which Is Alleged To Be An Ion Exchange Resin, Does Not Substantially Occlude The Porous Structure Of the Fluoropolymer Substrate*

Second, Ohashi does not disclose that an ion exchange resin substantially occludes an interior volume of a porous structure between the nodes and fibrils. While the office action suggests Ohashi's hydrophilic polymer coating corresponds to Applicants' ion exchange resin, [9/27/2010 Office Action at p. 2 (citing page 10, lines 20-38)], it never expressly contends that the hydrophilic polymer coating substantially occludes the polymeric sheet. Due to this deficiency alone, the rejections of pending office action should be withdrawn.

Ohashi's hydrophilic polymer coating does not substantially occlude an interior volume of the porous structure of the polymeric sheet. The passage cited by the office action describes Ohashi's "Reference Example 1." In that example,

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<sup>2</sup> During the December 20 telephone interview, the Examiner identified to Applicants' undersigned counsel U.S. Pat. No. 5,188,890 to Ohashi et al., and particularly referenced the disclosure at column 8, lines 16-25. This disclosure is found verbatim in the Ohashi EP reference that is of record at page 8, lines 13-17.

the substrate starts with an 80% porosity, and ends with a 70% porosity after the impregnation with the saponified copolymer. [Ohashi, p. 10, lines 25-29].<sup>3</sup>

In response to response to Applicants' arguments, the office action comments that Ohashi's interior volume encompasses "any sub-surface of the pore." [9/29/2010 Office Action at p. 5]. From this text, we understand the office action is suggesting that the occlusion of any microscopic portion of even a single pore might meet the claim language of Applicants' claim 1, notwithstanding the porous nature of the overall Ohashi composite.

However, pending claim 1 expressly recites "a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils and an interior volume of said porous structure between the nodes and fibrils." Such language is inconsistent with the interpretation espoused by the office action.

Thus, Ohashi fails to teach, disclose or suggest "a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils and an interior volume ... between the nodes and fibrils, ... said interior volume of said porous structure comprising a porosity of the polymeric sheet of greater than

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<sup>3</sup> In that example of Ohashi, a porous fluorinated resin film is "impregnated" with a methanol solution having dissolved, saponified copolymer of TFE and a vinyl acetate. [Ohashi, p. 10, lines 22-26]. Ohashi never describes this saponified copolymer as an ion exchange resin. If the rejection is maintained, the Examiner is respectfully requested to provide a factual basis for making this determination.

35% and being substantially occluded by an ion-exchange resin" as recited in Applicants' claim 1.

Accordingly, Applicants' independent claim 1, and dependent claims 3, 8, 9, 12-14, 24, 25, and 27-29 are respectfully asserted to be patentably distinct from Ohashi. Withdrawal of the rejections and allowance is requested.

*2. Murphy Discloses An Ion-Exchange Membrane With Proton Conducting Oxide Particles, And Does Not Have Ion Exchange Resin Substantially Occluding The Pores*

Murphy, the secondary reference in the obviousness rejection as to a portion of Applicants' pending claims, also does not disclose an ion exchange resin substantially occluding the pores. Instead, Murphy discloses a composite having "an oxidation resistant polymeric matrix" that is "filled with inorganic oxide particles forming a connected network extending from one face of the membrane to another face of the membrane." [Murphy, Col. 8, lines 47-51].

Figure 12 also shows this composite membrane:

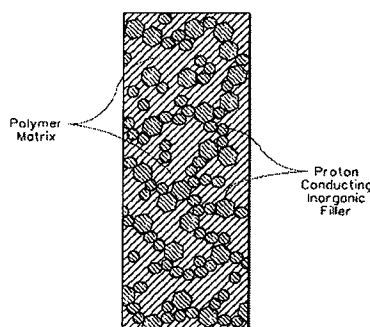


FIG. 12

There is no discussion in Murphy of ion exchange resin substantially occluding pores of the polymer matrix. To the contrary, Murphy teaches that the polymer matrix itself may be a kind of ionomer, perfluorosulphonic acid (PFSA). [Murphy, Col. 8, lines 58-64, and Col. 10, line 64 – Col. 11, line 8 (“Nafion” for the “polymer matrix”)]. Moreover, the PFSA membrane is not characterized by Murphy as having pores or being porous.

The office action refers to Murphy’s claim 1 as allegedly disclosing “ion-exchange *particles*” that partially fill a porous structure. [See p. 4]. This is not relevant given Applicants’ pending claims. Murphy’s oxide particles are not resin, and Murphy never discloses a porous membrane having ion exchange resin filling its pores.

Thus, Murphy fails to teach, disclose or suggest “a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils and an interior volume ... between the nodes and fibrils, ... said interior volume of said porous structure comprising a porosity of the polymeric sheet of greater than 35% and being substantially occluded by an ion-exchange resin” as recited in independent claim 1.



3. *Koslow's Composite Membrane Has Empty Pores And Does Not Have Ion Exchange Resin Substantially Occluding The Pores*

The office action cites Koslow, the tertiary reference in the obviousness rejection, for its disclosure of fumed silica as a kind of primary particle in his composite membrane. [9/27/10 Office Action at p. 4]. Without addressing the merits of that assertion, the office action does not contend that Koslow addresses the deficiencies of the cited Ohashi and Murphy references discussed above. Koslow fails to teach, disclose or suggest "a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils and an interior volume ... between the nodes and fibrils, ... said interior volume of said porous structure comprising a porosity of the polymeric sheet of greater than 35% and being substantially occluded by an ion-exchange resin" as recited in independent claim

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<sup>4</sup> Koslow teaches away from Applicants' claim 1. Koslow emphasizes repeatedly that materials produced by his invention include "sorber structures," having empty pores filled with air, and are not filled with ion-exchange resin. [See Abstract ("a volume of empty pores."), Col. 4, line 38-40 ("air (or gas)"), Col. 5, lines 27-34 ("large volumes of pores filled with air") and Col. 17, lines 24-28 ("large amounts of air (or other atmospheric gas) filling the remaining voids")].

### CONCLUSION

Applicants respectfully assert this Application is in condition for allowance, and request an early and favorable examination on the merits. If the determine is made that this Applicant is not in condition for allowance, the examiner is urged to contact the undersigned at the number provided to schedule a telephone conference in order to facilitate the further examination of this application.

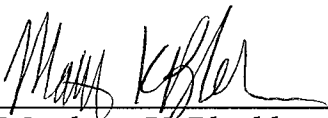
The cited references do not make out a *prima facie* rejection for anticipation or obviousness, because Ohashi, Murphy or Koslow fail to disclose the subject matter of claim 1, including for example, "a polymeric sheet ... having a porous structure with a microstructure of nodes and fibrils and an interior volume ... between the nodes and fibrils, ... said interior volume of said porous structure comprising a porosity of the polymeric sheet of greater than 35% and being substantially occluded by an ion-exchange resin" as recited in Applicants' independent claim 1. Independent claims 5 and 10, and dependent claims 3, 6, 8, 9, 12-15, 17, 24, 25, and 27-30 are patentably distinct for at least similar reasons.

Applicants have chosen in the interest of expediting prosecution of this patent application to distinguish the cited documents from the pending claims as set forth above. These statements should not be regarded in any way as

admissions that the cited documents are, in fact, prior art. Likewise, Applicants have chosen not to swear behind Murphy, cited by the office action, or to otherwise submit evidence to traverse the rejection at this time. Applicants, however, reserve the right, as provided by 37 C.F.R. §§ 1.131 and 1.132, to do so in the future as appropriate. Finally, Applicants have not specifically addressed the rejections of the dependent claims. Applicants respectfully submit that the independent claims, from which they depend, are in condition for allowance as set forth above. Accordingly, the dependent claims also are in condition for allowance. Applicants, however, reserve the right to address such rejections of the dependent claims in the future as appropriate.

Respectfully submitted,  
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